REMARKS/ARGUMENTS

This Amendment is in response to the Office Action dated March 24, 2005. Claims 1, 3-5, 7-9, and 11-24 remain pending in the present application. Claims 1-13 are rejected. Claims 1, 3-5, 7-9, and 11-13 have been amended, claims 2, 6, and 10 have been cancelled, and claims 14-24 have been added by this amendment.

Objections

The Examiner stated that Figure 1 should be designated by a legend such as – Prior Art— because only that which is old is illustrated. Accordingly, Applicant has included a photocopy of Fig. 1 herewith, having the "Prior Art" designation indicated with red ink. A formal drawing with this change will be submitted when the changes are approved by the Examiner.

The Examiner objected to the drawings as failing to comply with 37 CFR 1.84(p)(5) because they do no include the reference sign of "121" mentioned at page 7, line 13 of the specification. Accordingly, Applicant has amended Figure 4B to include this reference number, as indicated in red ink on a photocopy included herewith. A formal drawing with the indicated changes will be submitted when the changes are approved by the Examiner. Applicant therefore respectfully requests that the object be withdrawn.

The 112 Rejections

The Examiner rejected claims 1 and 9 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The Examiner stated that the recited limitation in claim 1 and 9 of a circuit board having a known orientation relative to the mounting module and a variable

orientation relative to the chassis is not enabled by the specification. Applicant disagrees. However, Applicant has amended claims 1 and 9 to remove this language and emphasize a spring connector and rigid connector aspect of the invention, and therefore respectfully requests that the rejection of claims 1 and 9 under 35 U.S.C. 112, first paragraph, be withdrawn.

The Examiner rejected claims 5, 8, and 13 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Examiner stated that, with respect to the "spring-loaded mount" recited in claims 5, 8, and 13, the specification fails to adequately describe how this feature "determines the equilibrium position of the board relative to the heatsink" (page 8, lines 15-18 of specification). However, the specification indicates that "the daughter card 120 is attached to the heatsink via a spring loaded mount 121, which allows optimal compression of the Thermal Interface Material (TIM) during the assembly process. The daughter card 120 adjusts under the influence of this spring-loaded mount 121 to achieve its optimum spatial orientation related to the heatsink" (page 7, lines 12-16). This description and the features of Fig. 4B indicate that the spring loaded mounts allow the daughter card to shift its orientation relative to the heatsink, e.g., due to the flexibility of the springs clearly evident within the mounts in Fig. 4B, and/or due to the space between the standoffs and standoff cap within the standoff housing of the spring mount, as clearly evident in the originally-filed informal drawing of Fig. 4B, so that the daughter board can achieve this equilibrium position (optimum spatial orientation) with respect to the heatsink assembly and allow optimal compression of the thermal interface material between processor and heatsink. Therefore, Applicant believes that the specification adequately describes the equilibrium position of the board in relation to the heatsink.

To make the space between standoff and standoff cap of the spring loaded mount more clear in the formal drawing version of Fig. 4B, Applicant has amended the formal drawing of Fig. 4B as indicated in red in the enclosed photocopy in accordance with the originally-filed informal Fig. 4B (which is also attached hereto for the Examiner's reference). The red-inked areas on the standoff caps of the amended Fig. 4B show where the spaces exist, as in the original Fig. 4B.

The Examiner also stated that the subject matter of the claimed invention is confused by the drawings lacking the spring loaded mount's element number 121, the spring mount in Fig. 4B not being present in Fig. 4C, and the spring mount in Fig. 4B being labelled as a standoff, which conflicts with the standoffs 150 in Fig. 4C, 8A, and 8B. Applicant has added the reference number 121 to the spring loaded mount in Fig. 4B as explained above. Applicant has also amended the specification for clarity so that the spring loaded mount 121 of Fig. 4B is described as "including securing screws 180, standoff caps, springs, and standoff housings, as shown." This is evident from Figs. 4B and 4C and the written specification (page 7), and thus is not new matter. The spring mount 121 is not labelled in Fig. 4C because Fig. 4C is an external view in which the spring part of the spring loaded mount is not easily visible and, if included, would confuse the representation of the self-adjusting standoffs 150, which are illustrated in this figure (Fig. 4B, not 4C, is meant to illustrate the spring loaded mount). However, screws 180 of the spring loaded mount illustrate a general placement of the mount 121 in Fig. 4C. The spring mount 121 in Fig. 4B has a "standoff cap" and "standoff housing" as labelled in Fig. 4B, but these are part of the spring loaded mount 121 and are not the same as the self-adjusting standoffs 150 of Fig. 4C, as is evident from the spring mount securing screws 180 shown in Fig. 4C which are not aligned with standoffs 150. Applicant's amendment to the specification, described above, clarifies this distinction in standoffs.

The Examiner stated that the specification fails to adequately describe the element of the "pin features" recited in claim 8, since Figs. 6A and 6B label certain elements as "locator pins" but the specification's description of the pin features does not seem to include these elements. Applicant has amended the specification at page 8, line 19 to state that these tapered pin features are "including fine locator pins 160 and 162 and coarse locator pin 164," for clarity. This is evident in Applicant's specification, for example, on page 7, lines 22-23, page 8, lines 1-2, and Figs. 6A and 6B, which illustrate and describe the tapered locator pins which are utilized to "orient the printed circuit board 104 relative to the mounting module 106", and thus is not new matter.

In view of the foregoing, Applicant respectfully requests that the rejection of claims 5, 8, and 13 under 35 U.S.C. 112, second paragraph, be withdrawn.

The 102 Rejections

The Examiner rejected claims 1-4 and 9-12 under 35 U.S.C. 102(e) as being anticipated by Ku (U.S. Patent No. 6,384,331) ("Ku"). Applicant has amended claims 1 and 9 to clarify an aspect of the claimed invention, and are believed patentable over the cited references.

Claim 1 recites a computer assembly including a chassis, a mounting module for cooling the computer assembly, and a circuit board suspended from the module. The mounting module is coupled to a processor on the circuit board, and the circuit board is connected to the module at an adjusted equilibrium spatial orientation of the circuit board that accommodates the coupling of the module and the processor. The connection is provided by at least one spring connector and at least one rigid connector, where the at least one spring connector allows the adjusting of spatial orientation of the circuit board relative to the module for connection to enable the

equilibrium spatial orientation. The at least one rigid connector adapts to the equilibrium spatial orientation and stabilizes and maintains the equilibrium orientation of the circuit board relative to the module. These features are disclosed in Applicant's specification throughout, e.g., page 5, lines 14-20, page 6, lines 1-14, page 7, lines 12-19, page 8, lines 11-18, and page 9, lines 1-8. Applicant's invention allows the tight coupling between a heatsink module and a processor to be accommodated by providing a spring connector to adjust to any variances in the coupling to provide an equilibrium connection, e.g., permitting full compressing of the thermal material between processor and heatsink, and providing rigid connectors that can adjust to secure that equilibrium connection, thereby making the connection more resistant to shock and vibration.

In contrast, Ku discloses a support device structure in which a heatsink 4 is coupled to threaded bolts 42 that extend through holes in a motherboard 2 to threadedly engage mounting posts 15 projecting from a support plate 1 within a casing (Fig. 5). A shock absorbing pad 16 is disposed between the support plate 1 and the motherboard to absorb impact forces on the plate 1 and prevent the plate from abutting the motherboard 2.

Ku does not disclose or suggest a circuit board connected to the module at an adjusted equilibrium spatial orientation of the circuit board that accommodates the coupling of the module and a processor. Ku's motherboard is connected to the heatsink by rigid bolts 42 that screw into mounting posts 15 that do not allow any adjusted equilibrium spatial orientation of the motherboard relative to the heatsink. Ku's bolts 42 force the heatsink and motherboard into an orientation dictated by the bolt's connection with the mounting posts 15, not an equilibrium orientation accommodating a processor-heatsink coupling. Furthermore, Ku does not disclose or suggest providing the connection between circuit board and module using at least one spring

connector that allows the adjusting of spatial orientation of circuit board to enable the equilibrium orientation. Ku provides threaded bolts for a connection, not spring connectors. Ku's shock absorbing pad 16 absorbs impact forces on the plate 1 and prevents contact of plate 1 and motherboard 2, but this does not address the connection between and orientation of module and circuit board as in Applicant's claim. In addition, Ku does not disclose or suggest providing the connection using at least one rigid connector that adapts to the equilibrium orientation and stabilizes and maintains that equilibrium orientation. Instead, Ku discloses rigid threaded bolts that do not adapt to any orientations, but force a parallel orientation based on their coupling to the posts 15. Claim 1 is therefore believed patentable over Ku.

Claim 9 recites a mounting module for a computer assembly that includes a heatsink assembly coupled rigidly to a chassis and is also coupled to a processor on a circuit board. At least one spring connector is coupled between heatsink assembly and circuit board allowing the circuit board to be connected to the heatsink assembly at an adjusted equilibrium spatial orientation that accommodates the coupling of heatsink assembly and processor. At least one rigid connector is coupled between heatsink assembly and circuit board, the rigid connector adapting to the equilibrium spatial orientation and stabilizing and maintaining the equilibrium orientation of the circuit board relative to the module.

As explained above with reference to claim 1, Ku does not disclose or suggest an equilibrium spatial orientation, nor a spring connector allowing the circuit board to be connected to the heatsink assembly at an adjusted equilibrium spatial orientation that accommodates the coupling of heatsink assembly and processor. Ku also does not disclose or suggest at least one rigid connector coupled between heatsink assembly and circuit board, which adapts to the

equilibrium spatial orientation and stabilizes and maintains the equilibrium orientation of the circuit board relative to the module. Claim 9 is therefore believed to be patentable over Ku.

Claims 3-4, and 11-12, are dependent on claims 1 and 9, respectively, and are believed patentable over Ku for at least the same reasons as claims 1 and 9, and for additional reasons. Amended claims 4 and 12 recite thermal interface material which is disclosed in Applicant's specification on page 7, lines 6-7 and 12-14. Amended claim 11 recites that the equilibrium position of the circuit board allows a tight coupling between the heatsink and the processor to insure adequate power dissipation from the processor (described in Applicant's specification on page 6, lines 9-14). Ku does not disclose or suggest such an equilibrium position.

In view of the foregoing, Applicant believes that claims 1, 3-4, 9, and 11-12 are patentable over Ku, and respectfully requests that the rejection under 102(e) be withdrawn.

The 103 Rejections

The Examiner rejected claims 5-8 and 13 under 35 U.S.C. 103(a) as being unpatentable over Ku in view of Bartyzel (U.S. Patent No. 6,331,937) ("Bartyzel"). Applicant has amended the claims as indicated above and believes the pending claims are patentable over the cited references.

Claims 5-8 are dependent on claim 1. Claim 1 is believed patentable over Ku for reasons explained above. The Examiner cited Bartyzel as teaching the use of spring-loaded bolts 14 to couple a heatsink 3 to a daughterboard 2. However, Bartyzel's spring-loaded bolts do not appear to be used to allow an adjustment of spatial orientation of the circuit board relative to the module to enable an equilibrium spatial orientation of the circuit board, as recited in claim 1. Bartyzel's

springs are used to provide a compression force that holds the heatsink tightly to the cover/circuit board and parallel to the circuit board, and they do not appear to allow an adjustment of spatial orientation of the circuit board relative to heatsink-- the shaft 16 fits tightly through holes 10 and 15 and does not allow an adjustment of orientation between heatsink and circuit board to accommodate a coupling of processor and heatsink.

Furthermore, Bartyzel does not disclose a rigid connector that adapts to the equilibrium spatial orientation and stabilizes and maintains the equilibrium orientation allowed by the spring connector. Bartyzel discloses no equilibrium spatial orientation, and so discloses no rigid connector that adapts to such an equilibrium position. Retention members 20 are set at predetermined distances from flange 18 of the connector and do not adapt to any equilibrium orientation. However, even if Bartyzel's spring-loaded bolts allowed an adjusted equilibrium spatial orientation of the circuit board relative to the heatsink, Bartyzel does not disclose or suggest any rigid connector that would stabilize and maintain that orientation—e.g., the spring 22 of Bartyzel's bolts could be compressed further and the bolt/heatsink could be moved even after the connection of circuit board and heatsink was made. Therefore, no equilibrium orientation can be stabilized and maintained using Bartyzel's mechanism.

In addition, Ku and Bartyzel combined do not disclose or suggest the invention of claim 1. Using the spring bolts of Bartyzel in Ku would provide spring bolts in place of Ku's threaded bolts 42, but this would not provide Applicant's spring connectors which allow an equilibrium orientation, and adaptive rigid connectors that stabilize and maintain that orientation, as explained above. Furthermore, Ku's rigid bolts 42 cannot adapt to an equilibrium orientation allowed by spring connectors, as required by Applicant's claim. Claim 1 is therefore believed

patentable over Ku in view of Bartyzel.

Accordingly, since claims 5-8 are dependent on claim 1, claims 5-8 are believed patentable over Ku in view of Bartyzel for at least the same reasons as claim 1, and for additional reasons. For example, claim 7 recites that the rigid connectors include a portion that is positioned to expand parallel to the surface of the circuit board within an aperture in the circuit board to secure the circuit board to the module without altering the equilibrium spatial orientation of the circuit board (as disclosed in Applicant's specification in Figs. 8A and 8B and page 8, lines 14-18). Neither Ku nor Bartyzel discloses such adapting rigid connectors. Amended claim 8 recites that the circuit board is a main logic board of the computer assembly, and the heatsink is located relative to the main logic board via pin features that include at least one fine locator pin and at least one coarse locator pin, as described in Applicant's specification on page 7, lines 22-23, page 8, lines 1-2, and Figs. 6A and 6B, and which is not disclosed or suggested by the cited references. Claim 11 is believed patentable as explained above; neither Ku nor Bartyzel disclose or suggest the recited equilibrium position.

Claim 13 is dependent on claim 9. Claim 9 recites at least one spring connector allowing a connection at an adjusted equilibrium spatial orientation of the circuit board, and at least one rigid connector adapting to the equilibrium spatial orientation and stabilizing and maintaining the equilibrium orientation of the circuit board relative to the module, similar to claim 1 and believed patentable over Ku in view of Bartyzel for at least similar reasons as explained above for claim 1. Claim 13 is therefore believed patentable over Ku in view of Bartyzel for at least similar reasons as its parent claim 9.

Applicant therefore believes that claims 5-8 and 13 are patentable over Ku in view of

Bartyzel, and respectfully requests that the rejection under 103(a) be withdrawn.

New Claims

New claims 14-24 have been added by this amendment. Claims 14-16 are dependent from claim 1, and claims 17-21 are dependent from claim 9, and are believed patentable for at least the same reasons as their respective parent claims and for additional reasons. For example, claim 14 recites that the potion of the at least one rigid connector is a standoff, and the rigid connector includes a fastener to be inserted within the standoff through an aperture in the circuit board, where a clearance space is provided between the standoff and the aperture that allows the standoff to adjust and expand parallel to the surface of the circuit board within the aperture when the fastener is inserted, as disclosed in Applicant's specification on page 8 and in Figs. 8A and 8B, and which is not disclosed or suggested by Ku and Bartyzel. Claims 15 and 19, and claims 16 and 20, recite that the circuit board is a daughter board or main logic board, respectively, as disclosed in Applicant's specification, for example, on page 7, lines 4-10. Claim 17 is patentable for reasons similar to those explained above for claim 7, and claim 18 is patentable for reasons similar to those explained above for claim 14. Claim 21 recites that the at least one spring connector is separate from the at least one rigid connector, as disclosed in Applicant's specification, for example, in Figs. 4B and 4C and on page 7, lines 14-19 and page 8, lines 11-15.

Independent claim 22 recites a method for securing a mounting module, including attaching a circuit board to a heatsink assembly such that the heatsink assembly is coupled to a chassis of the computer assembly and to a processor on the circuit board, where the circuit board is

attached to the heatsink assembly by adjusting the spatial orientation of the circuit board to an equilibrium position that accommodates the coupling of the heatsink assembly and the processor. The adjustment of the spatial orientation of the circuit board is allowed by at least one spring connector coupled between the heatsink assembly and the circuit board. The method also includes stabilizing and maintaining the equilibrium position of the circuit board by coupling at least one rigid connector between the heatsink assembly and the circuit board, where the rigid connector adapts to the equilibrium position allowed by the at least one spring connector. Claim 22 therefore recites similar features to claims 1 and 9, and is believed patentable over Ku and Bartyzel for at least similar reasons as explained above for claims 1 and 9.

Claims 23 and 24 are dependent from claim 22 and are patentable over Ku and Bartyzel for at least the same reasons and for additional reasons. For example, claim 23 recites that the at least one rigid connector includes a standoff positioned to expand parallel to the surface of the circuit board within an aperture, similar to claims 7 and 17, and which is not disclosed or suggested by Ku and Bartyzel. Claim 24 recites a blind engagement of mounting module and main logic board assisted by tapered pin features that include at least one fine locator pin and at least one coarse locator pin, as disclosed in Applicant's specification on page 7, lines 22-23, page 8, lines 1-2 and 19-22, page 9 lines 9-11, and Figs. 6A and 6B, and is not disclosed or suggested by Ku and Bartyzel.

In view of the foregoing, Applicant submits that claims 1, 3-5, 7-9, and 11-24 are patentable, and respectfully requests reconsideration and allowance of the claims as now presented.

Applicants' attorney believes this application in condition for allowance. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

Respectfully submitted,
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Date

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